



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>5</sup> : A23L		A2	(11) International Publication Number: WO 93/00825
			(43) International Publication Date: 21 January 1993 (21.01.93)
(21) International Application Number: PCT/NL92/00116 (22) International Filing Date: 1 July 1992 (01.07.92) (30) Priority data: 9101138 1 July 1991 (01.07.91) NL (71)(72) Applicant and Inventor: ZWARTS, Eduard [NL/NL]; Sparrenlaan 11, NL-7244 AN Barchem (NL). (74) Agent: VAN ASSEN, Jan, Willem, Bernard; Assenpatent B.V., P.O. Box 1029, NL-2240 BA Wassenaar (NL). (81) Designated States: CA, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, MC, NL, SE).		Published <i>Without international search report and to be republished upon receipt of that report.          In English translation (filed in Dutch).</i>	
(54) Title: METHOD FOR THE PREPARATION OF FOODSTUFFS, MORE IN PARTICULAR MEALS, FOODSTUFFS PREPARED ACCORDING TO THE METHOD, AND PRODUCTION LINE AND DEVICES THEREFORE			
(57) Abstract <p>The invention is about a method for the preparation of foodstuffs, more in particular meals, like all ready meals for consumption, by: a) heating the foodstuffs (1, 2) until nearly done; b) bringing the prepared foodstuffs (1, 2) after cooling down in a sealable wrapping (3); c) filling the wrapping with a mixture of N<sub>2</sub> and CO<sub>2</sub>; d) closing the wrapping (3); and e) subjecting the foodstuffs (1, 2) to a thermal shock by rapid cooling, so that the temperature in the heart reaches a value of about 2 °C. The invention is characterized in that successively after heating until nearly done under step a), the prepared foodstuffs (1, 2) are being subjected within reasonably short notice to the thermal shock under step e), under controlled humidity, to be named RH hereafter, depending on the nature of the foodstuff (1), after which a mixture of N<sub>2</sub> and CO<sub>2</sub> is inserted in the closable wrapping (3) in an appropriate manner, and the enclosure takes place. The invention also concerns devices for the carrying out of the method, as well as foodstuffs, particularly all ready meals that are prepared for consumption according to the method.</p>			

*FOR THE PURPOSES OF INFORMATION ONLY*

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FI	Finland	MI	Mali
AU	Australia	FR	France	MN	Mongolia
BB	Barbados	GA	Gabon	MR	Mauritania
BE	Belgium	GB	United Kingdom	MW	Malawi
BF	Burkina Faso	GN	Guinea	NI	Netherlands
BG	Bulgaria	GR	Greece	NO	Norway
BJ	Benin	HU	Hungary	PL	Poland
BR	Brazil	IE	Ireland	RO	Romania
CA	Canada	IT	Italy	RU	Russian Federation
CF	Central African Republic	JP	Japan	SD	Sudan
CG	Congo	KP	Democratic People's Republic of Korea	SE	Sweden
CH	Switzerland	KR	Republic of Korea	SN	Senegal
CI	Côte d'Ivoire	LI	Liechtenstein	SU	Soviet Union
CN	China	LK	Sri Lanka	TD	Chad
CS	Czechoslovakia	LU	Luxembourg	TG	Togo
DE	Germany	MC	Monaco	US	United States of America
DK	Denmark	MG	Madagascar		
ES	Spain				

Method for the preparation of foodstuffs, more in particular meals, foodstuffs prepared according to the method, and production line and devices therefore.

The interest for freshly cooled ready for use meals grows steadily these days.

Freshly cooled ready for use meals are meals that are mainly, but not exclusively, without artificial additions, like preservatives or anti-oxydant limitidly preservable in the refrigerator. Before final consumption, the prepared product, which has received a treatment that exists amongst other things of heating until nearly done, only has to be reheated. The reheating often takes place in a micro wave oven.

In connection with preparing preservable foodstuffs for consumption, a method is known from European Patent 0230978 for packing with pasteurisation of foodstuffs that can taint. The above mentioned method consists of stewing the foodstuff with a temperature around 90-95° C, inserting the product directly under natural convection so that cooling takes place in the wrapping, during which according to wish N<sub>2</sub> or a mixture of N<sub>2</sub> and O<sub>2</sub> is inserted, closing the wrapping and finally submitting the foodstuff to a thermal shock which brings the foodstuff in the center to a temperature of 2-6°C.

When one indicates in the continuation of the specification the preparation of foodstuffs with 1, and an assembly of foodstuffs and meals with 2 that are contained in a wrapping 3, it is remarked that with the meals prepared by the method known from the above mentioned EP 0.230.978, after heating and opening the wrapping 3 most probably no foodstuffs or meals can be prepared with Michelin two star quality.

With prepared meals of Michelin two star quality, meals are meant with an excellent taste and good microbiological tenability, which can be stocked at a low temperature, i.e. around 2°C, and can be prepared by the user by simply heating of the wrapping 3 with contents 1, 2.

According to said EP 0.230.978, foodstuffs 1, and more in particular meals 2, can be prepared by subjecting the suc-

- 2 -

cessively to the following process steps:

- a) heating the foodstuffs 1,2 until nearly done;
- b) inserting the heated foodstuffs 1, 2 after cooling down into a wrapping 3 that can be closed;
- c) filling the wrapping 3 with a mixture of  $N_2$  and  $CO_2$ ;
- d) closing the wrapping 3; and
- e) subjecting the foodstuffs 1, 2 to a thermal shock by fast cooling down, in such a way that the temperature in the heart reaches a temperature of about  $2^\circ C$ .

Such as mentioned earlier this method most probably does not result into prepared meals and/or foodstuffs of the high Michelin two star quality.

The object of the invention is to remove the mentioned objection by subjecting the heated foodstuffs 1, 2 within a short term after heating until nearly done below above mentioned step a) to the thermal shock mentioned below e), by cooling under controlled relative humidity, to be named RH in the following, depending on the nature of the foodstuff 1, after which a mixture of  $N_2$  and  $CO_2$  is inserted into the closable wrapping and the closing takes place.

About the RH, which is dependent on the nature of the foodstuff 1, is remarked that in case of meat, this amounts to about 75% and in case of vegetables 80-90%.

The invention also relates to prepared foodstuffs 1 or meals 2 and also to a production line and pertaining device for the preparation thereof.

By having the fast cooling down taking place soon after the heating to nearly done under controlled RH, an excellent taste is maintained of the foodstuffs 1 or meals 2 that are ultimately prepared by the user.

By inserting a suitable mixture of  $N_2$  and  $CO_2$  in the closed

- 3 -

meals 2 is ensured. It is remarked that from EP 0.242.183 a method is known for conditioning and packing of mussels and other bivalved seafood. According to this known method, mussels are brought into a wrapping which encloses these mussels closely and prevent them to open, during the following cooking process, in which the mussels are partially cooked.

After the partial cooking, the packages of mussels are cooled down to ambient temperature, during which the mussels either stay at ambient temperature or are frozen.

In connection with the method known from the EP 0.242.183, it is remarked that the conservation of the exceptionally fine taste of the ultimate product is obtained by causing the mussels to keep their shells closed during the relatively short precooking process. In order to increase the tenability of the mussels, in general freezing should always take place.

A difference with the method according to the invention is, that it is quite sure that no mixture of  $N_2$  and  $CO_2$  is applied, because before the cooking the mussels are provided with a deep drawn plastic vacuum wrapping.

It stands to reason that with the preparation of mussels no fast cooling down under controlled RH is applied.

In view of the known state of art it is not evident that the proper sequence of essentially very simple measures as cooking until nearly done, followed by fast cooling down under controlled RH, which is dependant of the foodstuff 1 or mealcomponent 2 in question, and providing with an admosphere in the closable wrapping 3 essentially consisting of a mixture of  $N_2$  and  $CO_2$ , results in prepared foodstuffs 1 or meals 2 of Michelin two star quality, which have moreover an exceptionally good tenability, without strong cooling.

Preferably, the heating of the meals will completely or partly

- 4 -

take place by microwave, with the exception of the case that the foodstuffs 1 consists of pasta or potatoes.

A preferred frequency that is applied during the high frequency heating or microwave heating is 915 MHz.

At the frequency of 915 MHz the depth of penetration of the microwaves is increased until about 10 cm. The increased depth of penetration causes a more uniform heating of the complete foodstuff 1.

An increased depth of penetration is the more important if the separate parts of the foodstuffs 1 have an irregular shape

The frequency of 915 MHz will further be indicated as radiowave frequency.

Because of the lower frequency than with the usual heating methods with high frequencies, the available power is limited, through which the method is limited to foodstuffs requiring only temperatures to 90°C.

With foodstuffs, of which the separate parts are irregularly shaped, and/or require a higher preparation temperature, a more usual high frequency device can be applied, which operates at a frequency of 2480 MHz. A heating device operating at a frequency of 2480 MHz will be further indicated below as a microwave device.

Potatoes, pasta products and some vegetables require an ambient water vapour during the heating until nearly done.

A preferred method for the application of the heating is the use of a steam heating tunnel 7, in which steam of 100-120°C is injected.

More in particular, when the foodstuffs 1 or meals 2, comprise

- 5 -

meat 4 and in some cases fish 4', preferably these are seared up in an infrared oven 5, after seasoning the surface.

The seasoning of the meat 4, of fish 4' can be done manually or continuously, with which one preferably uses a "seasoning bath". The seasoning bath consists of an emulsion containing the fish or meat seasonings.

After the seasoning of the surface of the meat 4 or the fish 4', these foodstuffs 4, 4' are submitted to the usual conditioning according to the invention. The searing up serves the conservation of the juices of the meat 4 or the fish 4' and obtaining a good crust.

In case of complete meals 2, these contain often sauces 6, which are directly supplied to the cooling down after preparation in which heating takes place.

In case that the foodstuffs 1,2 comprise vegetables 8, these are heated as needed in a steamheater 7, a microwaveheater 9, or a radiowaveheater 10. The meat 4 or fish 4' that has been seared up in an infrared oven 5, are preferably heated in a microwaveheater 9 in connection with the uniform heat development therein.

It is also possible to lead the seared up or not seared up meat 4 or the fish 4' through the steam heater 7 or the microwave heater 9, as needed.

In connection with the sauces 6 which are added to the foodstuffs 1, 2 it is further remarked, that during the preparation these are separately heated to a temperature of at least 80°C during 5 minutes, before the transport to the wrapping 3 which is thereafter cooled, provided with a CO<sub>2</sub> - N<sub>2</sub> atmosphere and closed. This with a view to pasteurization.

- 6 -

The preferred composition of the gas mixture with which the wrapping 3 is filled, is 30-40 volume % CO<sub>2</sub> and the rest N<sub>2</sub>.

Preferably, when heating the foodstuffs 1, 2, one starts from cleaned raw materials, which are at a temperature of 1-3°C, preferably 2°C.

According to another preferred method, the wrapping, in which the heated and subsequently cooled down foodstuffs 1, 2 are present, is first vacuumed and afterwards filled with the CO<sub>2</sub> - N<sub>2</sub> gas mixture.

By the vacuum treatment the oxygen which gives rise to perish promoting bacteria and the germination of spores, is removed as much as possible.

A preferred material for the wrapping 3 is PET, preferably c-PET. The term c-PET means crystalline polyethylene terephthalate (Bordex, 1990).

In view of the method of preparation of the foodstuffs 1, the material for the wrapping 3 has to meet the following demands:

- to be suited for use in microwave and oven ("duo ovenable")
- to dispose of good barrier properties, so that the quality of the prepared meal & deteriorates as little as possible during storage and transport;
- to remain firm during heating, cooling and transport, and not to deform;
- to be able to resist sudden temperature changes
- to be well closable "sealing"
- to be as little burden to the environment as possible, and preferably recycleable

- 7 -

The material c-PET is being preferred because:

- it is duo-ovenable
- it disposes of good barrier properties with respect to other wrapping materials;

c-PET transmission with respect to:

- $O_2 = 30 \cdot 10^{-11}$  cm/cm<sup>2</sup> s cm Hg
- $CO_2 = 100 \cdot 10^{-11}$  cm/cm<sup>2</sup> s cm Hg
- $H_2O = 4 \cdot 10^{-11}$  cm/cm<sup>2</sup> s cm Hg

(for  $O_2$  and  $CO_2$  these values are measured at 23°C and 30% RH, for  $H_2O$  was measured at 37,8°C and 90-95 RH).

The c-PET is used in a thickness of 0,3-0,4 mm preferably at the wrapping 3.

As mentioned before, the invention also relates to wrapped prepared foodstuffs 1 or meals 2 in a closed wrapping 3 and prepared according to the method discussed.

Preferably, the separate foodstuff components 1 or parts of meals 2, are in trays of c-PET with a thickness of 0,3 - 0,4 mm and a dimension per foodstuff 1 of 10x17x5 cm.

The one and the other relate to process technical considerations for causing the necessary thermal shock in order to obtain unexpected good taste properties.

For the same reason as mentioned above, when the meal 2 comprises sauces, this sauce 6 is in c-PET trays with a dimension of 5x5x3 cm.

Such as also mentioned before, the invention also relates to characterising apparatus for the preparation of foodstuffs 1 and/or meals 2 and a production line therefore.

From the document FR-A-2.544.179 an apparatus is known for the preparation and pasteurisation of packed foodstuffs. According to the method known from FR-A-2-544-179, foodstuffs that are

**SUBSTITUTE SHEET**

- 8 -

under vacuum in their wrapping, are shortly heated by immersion in a cooking or stewing bath and subsequently quickly cooled down to about 2°C by immersion in a cooling bath. It is remarked that by the vacuum treatment followed by heating and cooling down in a wrapping, undesired changes of taste can easily occur. Moreover, the tenability of foodstuffs 1 or meals 2 is most probably shorter than in the case where a N<sub>2</sub> - CO<sub>2</sub> gas filling is applied.

A characteristic device for the application of the important cooling down step after the short heating step, is a cooling device 11 with means for controlling the RH during the cooling down of the foodstuffs 1 or meals 2.

Preferably, the cooling device 11 is a cooling tunnel 12, with means for controlling the RH. The control of the RH can be made by spraying water in a controlled way.

The invention also relates to a production line for the preparation of prepared meals 2, comprising the now following steps I-VII with, conditioning means for:

- I Reception of raw materials for foodstuff I inclusive of quality control;
- II Preparation in component streams of meal 2;
- III Pre-conditioning of components of meal 2;
- IV Checking of preparation of components of meal 2;
- V Process step, comprising searing up of meat 4 and optionally of fish 4' in an infrared oven 5, followed by filling in trays 3 of prepared foodstuffs 1, 2, 4, 4', 6, 8 and insertion in a steam heater 7, microwave heater 9 or radio wave heater 10, respectively, followed by cooling down in a cooling tunnel 12, with means for controlling the RH, dependant of the foodstuff 1 in question, followed by filling the trays 3 with a mixture of CO<sub>2</sub> and N<sub>2</sub>, closing the trays 3 and checking the microbiological quality;
- VI Weight check and labelling, combination to meals 2, in-

- 9 -

clusive general quality control and stacking;

VII Means for storage and transport to user of prepared meals 2.

At the above mentioned phases, reception and quality control means of raw materials for the meals 2 are indicated under I by A.

At the following phase II, the distribution of streams of potatoes 13, pasta 14, fish 4', meat 4 and sauce components 6" are indicated by respectively 13, 14 (II), 8 (17), 4' (II) and 6" (II)

Furthermore, at the preparation stage III, successively is indicated from left to right with

- 13 (III) the preconditioning of the potatoes 13, consisting of scraping, peeling, washing, immerse into water with eventual adding of salt;
- 8 (III) the preconditioning of the different vegetables consisting of cutting, washing, eventual adding of spices;
- 4' (III) the adding of pepper, salt and eventually fish seasonings to the fish 4';
- 4 (III) the adding of pepper, salt and eventual meat seasonings to the meat 4;
- 6 (III) the mixing of the sauce components 6" to the sauce 6.

With reference to the process between quality judgment phase IV, the now following phases refer to:

- 13, 14 (IV) considering whether the potatoes 13 meet the quality requirements and are provided with salt and sufficient water;
- 8 (IV) considering whether the different vegetables 8 meet the quality requirements and furthermore are well cut and mixed;
- 4' (IV) considering whether the fish 4' is well seasoned;

**SUBSTITUTE SHEET**

- 10 -

- 4 (IV) considering whether the meat 4 is well seasoned;
- 6 (IV) considering whether the sauce 6 is well prepared.

In the process phase V, the following descriptions indicate:

- 4', 4 (V) 5 the searing up of fish 4' , eventually optional, and also optional of meat 4 in the infrared oven 5;
- 13, 14 (V) 3 the putting into trays 3 of respectively preconditioned potatoes 13 and pasta 14;
- 8 (V) 3 the putting into trays 3 of vegetable 8;
- 4' (V) 3 the putting into trays 3 of preconditioned fish 4';
- 4 (V) 3 the putting into trays 3 of preconditioned meat 4;
- 6 (V) 3 the putting into trays 3 of sauce 6.

With reference to the process step 6(V) 3, it is noticed that at the reaching of sufficiently high cooking temperatures in connection with the necessary pasteurization, it is possible now to directly connect the trays 3 with sauce 6 to the cooling step (V) 12 to be treated later.

In connection with the process heating phases of phase V the now following indications can be made.

Some vegetables 8, potatoes 13 and pasta 14 are heated preferably in a steam heater 7, this is indicated by 8, 13, 14 (V) 7.

Depending on the sizes and necessary temperatures, some preconditioned foodstuffs 1 can be best heated in a microwave heater 9, which works preferably at 2480 MHz, this now is indicated in Figure 1 very generally with 1 (V) 9; here it is indicated very generally by 1 that it is about foodstuffs 1.

Other foodstuffs, however, are better heated in a so-called radio wave heater 10, which is indicated in a similar way with 1 (V) 10.

- 11 -

After the heating step of phase V, all meal components are being subjected to a cooling step in a cooling tunnel 12 with means for the control of the RH depending on the foodstuff 1 concerned. This is indicated by (V) 12.

The phase V is concluded by the filling of the separate boxes 3 with a  $N_2$  -  $CO_2$  mixture, after which these are being sealed. This is indicated by (V) 15.

Before or after the sealing of the trays 3 at the process phase (V) 15, a microbiological quality control is being performed, this is indicated by B.

In the phase VI which relates to the finishing of the meals 2 to be obtained, a combined control of the weight, together with a labelling is being performed under (VI) 16, at which a quality control is performed under C. The phase VI is finished by stacking the obtained meals under step (VI) 17.

In the phase VII the stacked meals 2 are finally stored in a warehouse that is cooled, until transportation to the customer takes place. This is indicated with D.

Figure 2 relates to the heating and cooling down curves as a function of the time in which respectively:

- E = potatoes (pommes anna)
- F = vegetable (mixed vegetable)
- G = fish
- H = meat (baking dishes)
- I = meat (stewing dishes)
- J = coq au vin.

All curves E, F, G, H, I and J start at time zero at 2°C and end after the passing through of the cooling tunnel 12 also at 2°C.

**SUBSTITUTE SHEET**

- 12 -

The data of curve E of potatoes (pommes anna) are as follows:

Time	Temperature	Point in graph
----	-----	-----
0 min.	2°C	-
5 min.	100°C	E1
18 min.	100°C	E2
27 min.	2°C	E3

Data curve F (mixed vegetable):

Time	Temperature	Point in graph
----	-----	-----
0 min.	2°C	-
1,5 min.	100°C	F1
2 min.	70°C	F2
10 min.	90°C	F3
20 min.	2°C	F4

Data curve G (fish):

Time	Temperature	Point in graph
----	-----	-----
0 min.	2°C	-
6 min.	100°C	G1
16,5 min.	2°C	G2

Data curve H (meat frying dishes)

Time	Temperature	Point in graph
----	-----	-----
0 min.	2°C	-
2 min.	100°C	H1
16 min.	100°C	H2
25 min.	2°C	H3

**SUBSTITUTE SHEET**

- 13 -

## Data curve I (meat stewing dish)

Time	Temperature	Point in graph
---	-----	-----
0 min.	2°C	-
2 min.	100°C	I1
6 min.	100°C	I2
35 min.	2°C	I3

## Data curve J (coq au vin)

Time	Temperature	Point in graph
---	-----	-----
0 min.	2°C	-
2,5 min.	90°C	J1
12 min.	90°C	J2
22 min.	2°C	J3

- 14 -

## Claims

-----

1. Method for the preparation of foodstuffs (1), more in particular meats (2) by:

- a) heating the foodstuffs (1, 2) until nearly done;
- b) putting the prepared foodstuffs (1, 2) into a closable wrapping (3), after cooling;
- c) filling the wrapping (3) with a  $N_2$  and  $CO_2$  mixture;
- d) closing the wrapping (3); and
- e) submitting the foodstuffs (1, 2) to a thermal shock, by rapid cooling, by which the temperature in the heart reaches a temperature of about  $2^\circ C$ , characterized in that successively after the heating until nearly done under step a), the prepared foodstuffs (1, 2) are being submitted within reasonably short notice to the thermal shock under step e), under controlled relative humidity, to be named RH hereafter, depending on the nature of the foodstuff (1), after which a  $N_2/CO_2$  mixture is inserted in the closable wrapping (3) in an appropriate way.

2. Method according to claim 1, characterized in that the heating of the foodstuffs (1, 2) happens entirely or partially high frequency.

3. Method according to claim 2, characterized in that the frequency applied is 915 MHz, to be indicated further as radiowave frequency.

4. Method according to each of the previous claims, characterized in that potatoes and or pasta and/or vegetables are heated in a steam heater.

5. Method according to each of the previous claims, characterized in that aroma components, flavourings, herbs, spices and salt are added to the foodstuffs (1, 2).

- 15 -

6. Method according to each of the previous claims, characterized in that meat (4), and/or fish (4') is added to the foodstuffs (1, 2), of which the surface is seared up in an infrared oven (5) preferably after seasoning.

7. Method according to each of the claims 1 including 6, characterized in that sauces (6) are added to the foodstuffs 1, 2, which are supplied to the cooling directly without extra heating.

8. Method according to each of the previous claims, characterized in that the foodstuffs (1, 2) contain vegetables (8), which is being heated as needed in a steam heater (7), micro wave heater (9) or radio wave heater (10).

9. Method according to each of the previous claims, characterized in that the foodstuffs (1, 2) contain meat that has been seared up in an infrared oven (5), which is heated in a microwave heater (9).

10. Method according to each of the previous claims, that the foodstuffs (1, 2) do or do not contain fish that was seared up in an infrared oven, which is conducted according to desire through the steam heater (7) or the microwave heater (9).

11. Method according to each of the previous claims, characterized in that the foodstuffs (1, 2) contain sauces (6), heated separately during preparation, to a temperature of at least 80°C during five minutes and transported separately to the wrapping (3), which is cooled down thereafter, provided by a  $\text{CO}_2/\text{N}_2$  atmosphere and closed.

12. Method according to each of the previous claims, characterized in that the closable wrapping (3) is filled with a mixture of 30-40 volume percent  $\text{CO}_2$  and the rest  $\text{N}_2$ .

**SUBSTITUTE SHEET**

- 16 -

13. Method according to each of the previous claims, characterized in that the starting point is foodstuffs (1, 2) originally at 1-3°C, preferably at 2°C, which are heated afterwards.

14. Method according to each of the previous claims, characterized in that the wrapping (3) is vacuumated with foodstuffs (1, 2) before filling it up with the CO<sub>2</sub> and N<sub>2</sub> mixture

15. Method according to each of the previous claims, characterized in that as material for the wrapping (3) PEI, preferably c-PET is applied.

16. Packed prepared meals (1,) and/or meals (2) in a closed wrapping (3) treated according to one or more of the claims 1 to 15.

17. Packed prepared meals (1) and/or meals (2) according to claim 16, characterized in that the wrapping (3) consists entirely or mainly of c-PET, with a thickness of 0,3 to 0,4 mm and size per foodstuff (1) of 10x17x5 cm.

18. Packed prepared foodstuffs (1) and/or meals (2) according to claim 16 or 17, where the foodstuff (1, 2) is provided with sauce (6), characterized in that the sauce (6) is in trays of c-PET size 5x5x3 cm.

19. Device for the preparation of prepared foodstuffs (1) or meals (2), which are in a wrapping (3), according to claims 1-18, which device contains means for quickly heating and thereafter quickly cooling down of the foodstuffs (1) and/or meals (2), characterized in that this contains a cooling device (11) with means for controlling of the RH during cooling down.

20. Device according to claim 19, characterized in that the cooling device 11 is a cooling tunnel.

- 17 -

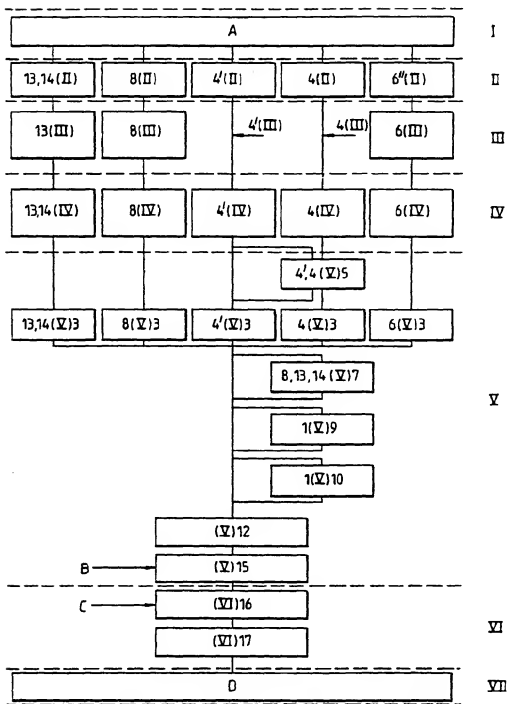
21. Product line for the preparation of prepared meals (2) according to claim 1-18, characterized by the fact that this contains the now followinging phases with means of treatment:

- I Reception foodstuff (1) raw materials, inclusive of quality control
- II Preparation in meal (2) component streams;
- III Preparation of meal (2) components;
- IV Control on preparation of meal (2) components;
- V Process step, containing searing up of meat (4) and optionally of fish (4') in infrared oven (5) followed by putting into trays and treatment of prepared foodstuffs (1, 2, 4, 4', 6, 8) respectively in steam heater (7), microwave heater (9) or radio wave heater (10), followed by cooling down in a cooling tunnel (12) with means for the direction of the RH, depending on the foodstuff (1) concerned, followed by the filling of the trays (3) with a CO<sub>2</sub> and N<sub>2</sub> mixture, closing of the trays (3) and microbiological quality control;
- VI Weight control and labelling, joining into meals (2), including general quality control and stacking;
- VII Storage of ready meals (2).

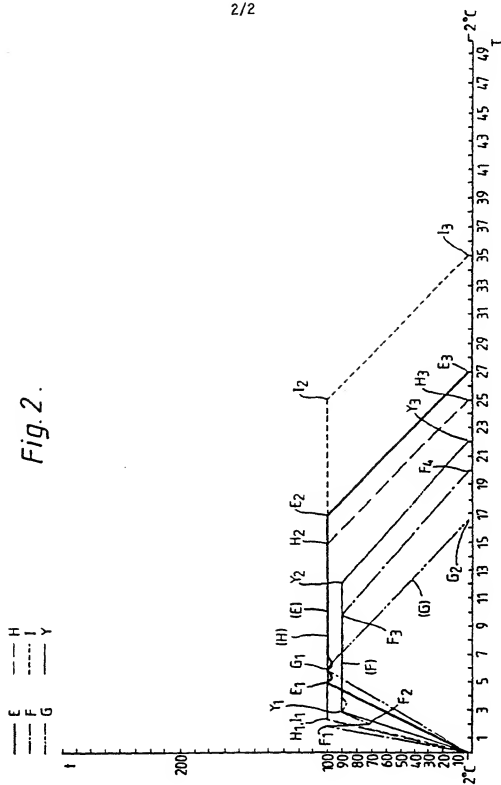
SUBSTITUTE SHEET

1/2

Fig. 1.



SUBSTITUTE SHEET



SUBSTITUTE SHEET





## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification<sup>5</sup> :</b>  <b>A23L 3/005, 3/01, 3/16, 3/3418</b>	<b>A3</b>	<b>(11) International Publication Number:</b> <b>WO 93/00825</b>  <b>(43) International Publication Date:</b> 21 January 1993 (21.01.93)
<b>(21) International Application Number:</b> PCT/NL92/00116  <b>(22) International Filing Date:</b> 1 July 1992 (01.07.92)  <b>(30) Priority data:</b> 9101138 1 July 1991 (01.07.91) NL  <b>(71)(72) Applicant and Inventor:</b> ZWARTS, Eduard [NL/NL]; Sparrenlaan 11, NL-7244 AN Barchem (NL).  <b>(74) Agent:</b> VAN ASSEN, Jan, Willem, Bernard; Assenpatent B.V., P.O. Box 1029, NL-2240 BA Wassenaar (NL).  <b>(81) Designated States:</b> CA, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, MC, NL, SE).		<b>Published</b> <i>With international search report.          Before the expiration of the time limit for amending the          claims and to be republished in the event of the receipt of          amendments.</i>  <b>(88) Date of publication of the international search report:</b> 18 March 1993 (18.03.93)
<b>(54) Title:</b> METHOD FOR THE PREPARATION OF FOODSTUFFS, MORE IN PARTICULAR MEALS, FOODSTUFFS PREPARED ACCORDING TO THE METHOD, AND PRODUCTION LINE AND DEVICES THEREFORE  <b>(57) Abstract</b>  The invention is about a method for the preparation of foodstuffs, more in particular meals, like all ready meals for consumption, by: a) heating the foodstuffs (1, 2) until nearly done; b) bringing the prepared foodstuffs (1, 2) after cooling down in a sealable wrapping (3); c) filling the wrapping with a mixture of N <sub>2</sub> and CO <sub>2</sub> ; d) closing the wrapping (3); and e) subjecting the foodstuffs (1, 2) to a thermal shock by rapid cooling, so that the temperature in the heart reaches a value of about 2 °C. The invention is characterized in that successively after heating until nearly done under step a), the prepared foodstuffs (1, 2) are being subjected within reasonably short notice to the thermal shock under step e), under controlled humidity, to be named RH hereafter, depending on the nature of the foodstuff (1), after which a mixture of N <sub>2</sub> and CO <sub>2</sub> is inserted in the closable wrapping (3) in an appropriate manner, and the enclosure takes place. The invention also concerns devices for the carrying out of the method, as well as foodstuffs, particularly all ready meals that are prepared for consumption according to the method.		

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FI	Finland	MN	Mongolia
AU	Australia	FR	France	MR	Mauritania
BB	Barbados	GA	Gabon	MW	Malawi
BE	Belgium	GB	United Kingdom	NL	Netherlands
BF	Burkina Faso	GN	Guinea	NO	Norway
BG	Bulgaria	GR	Greece	NZ	New Zealand
BJ	Benin	HU	Hungary	PL	Poland
BR	Brazil	IE	Ireland	PT	Portugal
CA	Canada	IT	Italy	RO	Romania
CF	Central African Republic	JP	Japan	RU	Russian Federation
CG	Congo	KP	Democratic People's Republic of Korea	SD	Sudan
CH	Switzerland	KR	Republic of Korea	SE	Sweden
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovak Republic
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CS	Czechoslovakia	LU	Luxembourg	SU	Soviet Union
CZ	Czech Republic	MC	Monaco	TD	Chad
DE	Germany	MG	Madagascar	TG	Togo
DK	Denmark	MI	Mali	UA	Ukraine
ES	Spain			US	United States of America

## INTERNATIONAL SEARCH REPORT

International Application No. PCT/NL 92/00116

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all)*		
According to International Patent Classification (IPC) or to both National Classifications and IPC		
Int.Cl.5	A 23 L 3/005	A 23 L 3/01 A 23 L 3/16
A 23 L 3/3418		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
Int.Cl.5	A 23 L	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b>		
Category *	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	US,A,4898744 (L. LIGGETT et al.) 6 February 1990, see column 5, lines 3-25; column 6, lines 9-13; claims; examples	1,4-8, 10-12, 14,16
Y	---	2,3
Y	US,A,4764385 (P. BUTLAND) 16 August 1988, see column 3, line 66 - column 4, line 33; claims; figures; examples	2,3
X	CH,A, 599756 (M. MAGNIN) 31 May 1978, see the whole document	1,5,7, 11,14, 16
	---	-/-
<p>* Special categories of cited documents: <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"A" document member of the same patent family</p>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
17-12-1992	10.02.93	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	Mme Dagmar FRANK	

Form PCT/ISA/210 (second sheet) (January 1983)

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	US,A,3889009 (S.P. LIPOMA) 10 June 1975, see column 6, lines 31-41; column 7, line 4 - column 8, line 46; column 3, lines 5-30; claims; figures ---	1-4,6,8 -10,19, 20
A	US,A,4957761 (D.B. HALE) 18 September 1990, see column 1, line 59 - column 4, line 53 ---	1
A	US,A,3437495 (M.R. JEPPSON) 8 April 1969, see the whole document ---	1-5,7,8 ,19,20
A	World Patents Index Latest, AN=90-190131 (25), Derwent Publications Ltd, London, GB, & JP,A,2125732 (TORAY) 14 May 1990, see abstract ---	15,17
A	US,A,5023137 (R.R. SMITH et al.) 11 June 1991, see the whole document -----	15-17

NL 9200116  
SA 65169

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 27/01/93. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4898744	06-02-90	None	
US-A- 4764385	16-08-88	None	
CH-A- 599756	31-05-78	None	
US-A- 3889009	10-06-75	None	
US-A- 4957761	18-09-90	None	
US-A- 3437495	08-04-69	None	
US-A- 5023137	11-06-91	EP-A- 0511418	04-11-92

SP-1 FORM 10479

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82